Lec. 6

29/10/2016

→ 3 chapters.

Contents

* General Concept of NN.
* Architecture of NN. – i/P layer ⟶ O ⟶ o/p layer
  - hidden layers
    - ≥ 1 multilayer preceptron
    - = 0 Single preceptron (only i/p & o/p layers)

- weights (بتشتغل كحلول (احدماتوصل لها) لأحسن weights في الNN)
- و – Bias (threshold)

↳ For example in classification

O → △ ✗

O → ☐ ✗

O → O ✓

activation function

net = f (x, w) b

= Σ – –

threshold: Ex in recognition

A → x_1 →

B → x_2

C → x_3

o/p

Say A عاوز → بعض weight على ال

عند ال A الحل يطلع هو وغيره كله احتمالات

– energy function

E → T – O (distance)

↳ في الأول بنبدأ ب initial random weights ← Small values وبنغير

في ال w فيتغير E ⇐ $\frac{\partial E}{\partial w}$ ← min.

↳ gradient decent (OR) Momentum

_Learning rate

* Back Propagation NN.
* ReCurrent NN.
* Hopfied NN.

بس بنقى عارفين الConcept بتاعهم اهو دلوقتي

midterm?

(Pattern recognition)
Face Recognition by using NN

→ direction of face (R, L, U, D) Right left up down

→ person P.A, P.B, P.C

Face Recognition:

a Science based on image processing

image → [image processing] → Features
↳ for example in any person

Features {
- Color.
- Shape.
- age
- length
:
:

main Procedures:

- Capture the image.
- Image enhancement.
- Features Extraction ✓✓
  ↳ I/P for NN
- ↳ Features Selection (Significant feature)
  (علشان كل ما يزيد هيزود ال Processing time).

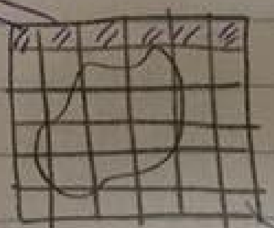
Ex

	A	B
Feature	150cm	151cm
	white	Black
	25yrs	50yrs

150cm / 151cm ← not a significant one (مش هتفرق كتير)

✓✓

pixels
↓
intensity of pixel
↓
high → W
low → B



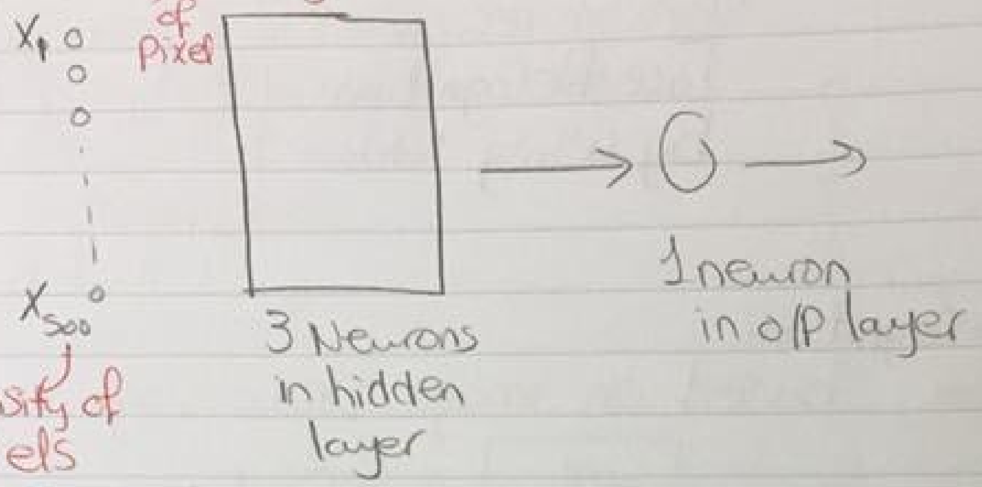
→ 500 pixels

0 ⟷ 255
Black — White

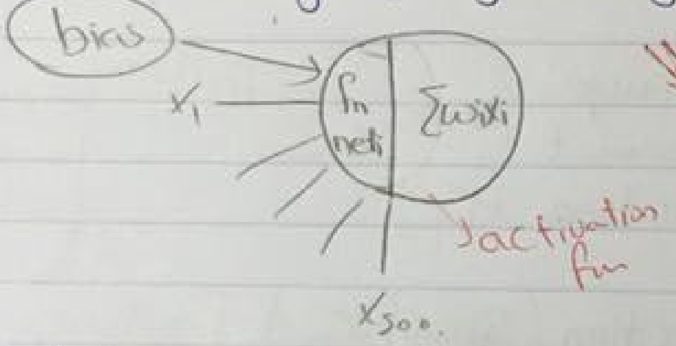
$\begin{bmatrix} 0 & 0 & 0 & 1 & \ldots \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$ →₅₀₀ (Say) ⇒ R ,
↓500

$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$ ⇒ left

no. of pixels → (500 i/p neuron, 1 o/p neuron) → recognition (U or D or L or R)



1) Training (initialization of w, - - - - -)
↳ learning → by an Algorithm (BPNN Algorithm)



⇓ Supervised ✓

2] Validation. → اختبار صورة من ال data set
3] Test. → صورة خارج ال data set "

up → down False
up → up True
up → Right False

from Some equations (no. of F & no. of T ...)
we Can Calculate Confusion matrix & then the accuracy (metrix) ل مش مطالبين نستخدمها

Classification between a car and a van.

① Features extraction
- weight
- length
- non. of wheels
- Size

no. of i/p neurons = no. of Features

no. of o/p neurons = 1. (one decision)

② Training & learning.